
Begomoviruses: Occurrence and Management in Asia and Africa

Sangeeta Saxena • A. K. Tiwari
Editors

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 Springer

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Preface

Begomoviruses of family *Geminiviridae* are fast-evolving plant viral pathogens with small circular single-stranded DNA as genome. They cause diseases in various crops in the tropical and subtropical regions, and with change in climatic conditions due to global warming, now temperate regions are also under the threat of these viruses. They are transmitted by the whitefly (*B. tabaci*) and enjoy a wide host range. Begomoviruses are geminate particles and can be either monopartite or bipartite based on the number of genomic components present as one (DNA-A) and two (DNA-A and DNA-B), respectively. The two genomic components (bipartite) designated as DNA-A and DNA-B are of ~2,600–2,800 nucleotides each. A number of serious diseases of commercially cultivated crops of the *Fabaceae*, *Malvaceae*, *Solanaceae*, and *Cucurbitaceae* families are caused by begomoviruses which are considered as a threat to their cultivation in India and abroad. Accurate and reliable diagnosis is important for successful disease management, since plants infected by begomoviruses do not recover and uprooting followed by burning of infected material seems to be the only solution. Infected plants besides suffering serious yield losses also are a source of inoculum in the field as the virus is further picked up and spreads to healthy plants. Reports of occurrence of new viruses and reemergence of several known viruses in new niches are pouring in from all over the world. In such a dynamic system, the production of disease-free crops with optimum yield relies on the early detection of the causal virus and better understanding of its biology to evolve appropriate management strategies. Considerable progress has been achieved in the characterization, detection, and management of the virus on different crop species in the last decade. This book covers all the latest aspects of begomoviruses including their genome organization, diagnosis, transmission, management, and occurrence and a general introduction in Unit I. In Unit II, the current status of begomoviruses from countries of Asia and the African continent has been detailed giving a comprehensive overview. Each chapter illustrates the diseases caused by begomoviruses on different crops, detection techniques, and management strategies in support of research findings by the presentation of data, graphics, figures, and tables. This book will provide a wide opportunity to the readers to have complete information of begomoviruses from one source. It will be a useful resource for researchers and extension workers involved in begomovirus disease diagnosis and molecular biology. Expert detection, accurate diagnosis, and timely management play a significant role in keeping plants free from pathogens. In this book, expert

researchers have shared their research experiences straight from the lab to the field detailing traditional as well as transgenic approaches which are vital toward the control of begomoviruses across the globe. We believe this book will enhance the existing knowledge of readers in the field of plant pathology in general and geminivirus in particular.

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About the Editors



Dr. Sangeeta Saxena was born on March 15, 1968, in Dehradun, a city in the foothills of the Himalayas in India. She did her B.Sc. (botany (Hons)), M.Sc. (microbiology), M.Phil. (biotechnology), and Ph.D. from Aligarh Muslim University, Aligarh, India. Her Ph.D. was carried out at the Plant Virology Lab, National Botanical Research Institute (CSIR), Lucknow, after being awarded a CSIR-UGC JRF-NET fellowship from the Government of India. She obtained her Ph.D. degree through her thesis entitled “Development of diagnostics against some important papaya viruses” in 1998. Her Ph.D. work led to first-time identification of the organism causing leaf curl disease in India which is a begomovirus. Further she was awarded a postdoctoral fellowship from the Swedish Council for Scientific Research and Natural Sciences (NFR) and worked at the Swedish University of Agricultural Sciences, Umea S-901 83, Sweden, during Dec. 1998–Dec. 2000. She was awarded the DST Young Scientist Award under SERB Fast Track Proposal for Young Scientists scheme from the Department of Science and Technology, Government of India (from 2002 to 2005). She joined the Department of Biotechnology of Babasaheb Bhimrao Ambedkar University (A Central University), Lucknow, India, in 2005 and is currently working there as an associate professor. Her area of research is molecular virology, RNAi in general and begomoviruses causing papaya leaf curl disease in particular. She has carried out four independent research projects in the area of plant virology, diagnostics, and RNAi from various funding agencies like CST-UP, UGC, DBT, and DST of the Government of India. She has published more than 40 research and review articles in national and international journals and has authored four book chapters in edited books. Dr. Saxena is widely traveled and has visited countries like Sweden, the USA, France, Finland, and China to attend several workshops and conferences. Currently, Dr. Saxena is studying various aspects related to intra- and inter-kingdom gene regulation by plant miRNAs apart from her main research interest to develop virus-resistant plants against begomoviruses.



Dr. Ajay K. Tiwari is working as a scientific officer at the UP Council of Sugarcane Research, UP, India. He did his Ph.D. in 2011 on cucurbit viruses in the Department of Biotechnology of CCS University, Meerut, UP, India. Dr. Tiwari is a regular member of the British Society of Plant Pathology, Indian Phytopathological Society, Sugar Technologists Association of India, International Society of Sugar Cane Technologists, Society for Sugarcane Research and Promotion, Prof. H. S. Srivastava Foundation, and Society for Plant Research and Educational Promotion. He has published 70 research articles and 12 review articles in national and international journals. He has

also published six book chapters in edited books and has also authored seven edited books. He has submitted more than 150 nucleotide sequences of plant pathogens in the GenBank to his credit.

He is a regular reviewer and member of the editorial board for many international journals. He has been awarded the Young Researcher Award in Italy in 2011 and the Young Scientist Award by DST-SERB and was nominated for the Narasimhan Award by the Indian Phytopathological Society. Very recently he was awarded the Young Scientist Award by the Chief Minister of the State Government of UP for his outstanding contribution in the area of plant pathology. Dr. Tiwari is the recipient of many international travel awards given by DST, DBT, and CSIR from India, Patholux from Luxembourg, and IOM from Brazil. He has visited China, Italy, Germany, and Thailand for conferences and workshops. He has been involved in research on the molecular characterization and management of agricultural plant pathogens for the last 9 years. Currently he is working on the molecular characterization of sugarcane phytoplasmas and their secondary spread in nature.